KIET GROUP OF INSTITUTIONS
Connecting Life with Learning
www.kiet.edu
Delhi-NCR, Ghaziabad

NIRF-2021
Engineering Rank - 176
Pharmacy Rank Band (76-100)

Accredited by
NAAC with Grade "A+"

NBA Accredited Courses
CSE, ECE, EEE, IT, ME, CE, MCA,
MBA and Pharmacy

2nd Rank
"Private Institutions (Technical)"
in India by ARIIA 2021 Ranking

Diamond Rating with QSI Gauge

KIET School of Computer Applications (KSOCA)

TechEdge

Technical

Newsletter

Vol. V Issue 11, Nov2022

In This Issue.....

Compiled by:-
Bharti Ghildiyal,Aniket Bharti
Atif Ali(MCA 3rd sem)

Designed by:-
Sujeet Pratap Singh
(MCA Dept.)

Coordinated by:-
Ms. Shalika Arora
(Asst. Prof.,MCA)

Alumni Section

Apoorv jain
Subject Matter Expert
(Computer Science Engineering)
Chegg

BLOCKCHAIN

Blockchain technology has become one of the most intriguing technology sectors in recent years, spawning a crowd of projects promising various innovations and competing for funding and adoption. Blockchain is a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. Virtually anything of value can be tracked and traded on a blockchain network, reducing risk, and cutting costs for all involved. Blockchain is ideal for delivering that information because it provides immediate, shared and completely transparent information stored on an immutable ledger that can be accessed only by permissioned network members. A blockchain network can track orders, payments, accounts, production and much more. And because members share a single view of the truth, user can see all details of a transaction end to end, giving user greater confidence, as well as new efficiencies and opportunities.

Transaction in Blockchain: Steps involved in transaction on a blockchain network are as follows:

- **Step 1**: A user signs off on a transaction from their wallet application, attempting to send a certain crypto or token from them to someone else.
- **Step 2:** The transaction is broadcasted by the wallet application and is now awaiting to be picked up by a miner on the according blockchain.
- **Step 3:** Miners on the network (sometimes referred to as nodes, but not quite the same!) select transactions from these pools and form them into a 'block'. A block is basically a collection of transactions in addition to some extra metadata. Every miner constructs their own block of transactions. Multiple miners can select the same transactions to be included in their block.
- **Step 4:** By selecting transactions and adding them to their block, miners create a block of transactions. To add this block of transactions to the blockchain (which means having all the nodes on the blockchain register the transactions in this block), the block first needs a signature (also referred to as a 'proof of work').
- **Step 5:** The miner that finds an eligible signature for its block first, broadcasts this block and its signature to all the other miners.
- **Step 6**: Other miners now verify the signature's legitimacy by taking the string of data of the broadcasted block and hashing it to see if its hash output indeed leads to its included signature. If it is valid, the other miners will confirm its validity and agree that the block can be added to the blockchain. The block can now be added to the blockchain and is distributed to all other nodes on the network. The other nodes will accept the block and save it to their transaction data as long as all transactions inside the block can be executed according to the blockchain's history.
- **Step 7**: After a block has been added to the chain, every other block that is added on top of it counts as a 'confirmation' for that block.

Types of blockchain networks

There are several ways to build a blockchain network. They can be public, private, permissioned, or built by a consortium.

- Public blockchain networks: A public blockchain is one that anyone can join and participate in, such as Bitcoin. Drawbacks might include substantial computational power required, little or no privacy for transactions, and weak security. These are important considerations for enterprise use cases of blockchain.
- Private blockchain networks: A private blockchain network, similar to a public blockchain network, is a decentralized peer-to-peer network. However, one organization governs the network, controlling who is allowed to participate, execute a consensus protocol, and maintain the shared ledger. Depending on the use case, this can significantly boost trust and confidence between participants. A private blockchain can be run behind a corporate firewall and even be hosted on premises.
- Permissioned blockchain networks: Businesses who set up a private blockchain will generally set up a permissioned blockchain network. It is important to note that public blockchain networks can also be permissioned. This places restrictions on who is allowed to participate in the network and in what transactions. Participants need to obtain an invitation or permission to join.
- Consortium blockchains: Multiple organizations can share the responsibilities of maintaining a blockchain. These pre-selected organizations determine who may submit transactions or access the data. A consortium blockchain is ideal for business when all participants need to be permissioned and have a shared responsibility for the blockchain.

Blockchain Platforms

Blockchain platforms operate as a development platform with an integrated distributed ledger. This ledger is essentially an encrypted storage space for all kinds of data. The integrated data is then used to help develop consensus mechanisms that will be used to validate and approve transactions. Four most popular blockchain platforms are as follows:

- **Hyperledger Fabric:** It is an open source, permissioned blockchain framework, started in 2015 by The Linux Foundation. It is a modular, general-purpose framework that offers unique identity management and access control features, which make it suitable for a variety of industry applications such as track-and-trace of supply chains, trade finance, loyalty, and rewards, as well as clearing and settlement of financial assets.
- **Ethereum:** Ethereum was designed to overcome the limitations of bitcoin and is well known for its cryptocurrency, Ether (ETH), the second-largest token by market cap. But Ethereum itself is a blockchain platform for the development of decentralized applications (dApps), referred to as the Ethereum Virtual Machine. It is the most popular blockchain platform used today and is the basis for many NFTs, DeFi projects, altcoins, and metaverse projects. It is leveraged by many industries for various use cases and holds the capability of smart contracts which is a self-executing contract with the terms of the agreement between buyer and seller being directly written into lines of code. Solidity is contract oriented high-level programming language. Furthermore, it is part of a robust online network that constantly upgrades and grows its product line. The market capitalization of Ethereum is second only to Bitcoin, and it ensures a fair financial system.

- **IBM blockchain:** It aims to integrate blockchain technology into the established IT world to improve privacy and efficiency. To this end, it offers developer tools and expert guidance to help companies build blockchain apps for their services, such as finance and supply chain management. It benefits from brand recognition and has partnered with banks and charities. Their technology is based on the Hyperledger platform, a project within the Linux Foundation umbrella, and their project is called Fabric. This is a game-changer, since it is a permissioned blockchain oriented for applications in enterprise and private business for processes such as chain supply management, health care electronic medical records among others. There are thousands of installations of this blockchain.
- **Ripple:** It is a blockchain platform designed to improve the existing banking and financial services industries, effectively serving as a settlement layer between different financial institutions. The platform's native token, XRP, consistently ranks among the top ten cryptocurrencies by market cap. Ripple can be seen as an improved version of SWIFT and is ideal for cross-border transactions. The Ripple platform has partnered with many established financial institutions, such as Santander and Bank of America, but it has also come under some criticism from the blockchain community. Critics of Ripple highlight that the Ripple Foundation pre-mined and holds the majority of XRP, which could be seen as against the crypto principles of decentralization.

Blockchain in Industries:

- **Healthcare:** With Blockchain, healthcare organizations can capture an individual's lifetime medical history. Privacy can be maintained via permissioned Blockchains, where confidentiality is established through an agreement. To maintain doctor/patient privacy parties can view essential transactions and request relevant information when necessary.
- **Education:** Educational institutions are turning to Blockchain to avoid fraudulent certifications as well as to ease record-keeping needs for students and alumni. While existing paper-based certification systems may be subject to loss or fraud, the need for a centralized database of credentials and achievements has become critical in the face of an increasingly mobile and digital population.
- **Government:** Governments are turning to Blockchain as a potential means to better serve their citizens and improve processes for public administrative functions. The ability to record transactions on distributed ledgers offers new approaches for governments to improve transparency, prevent fraud, and establish trust.
- **Logistics/Transportation:** Blockchain is poised to create major cost and time saving opportunities for the supply chains, logistics, and transportation sectors. It can be seen as a new method of tracking any kind of product shipment or transaction, tracking performance across the life cycle of the product while supporting environmentally and socially responsible procurement.

Effect of Blockchain on Modern Businesses:

Blockchain cryptology replaces third-party intermediaries as the keeper of trust. By using mathematics instead of intermediaries. Blockchain can help reduce overhead costs and hassles for companies or individuals when trading assets.

Blockchain enhances accuracy and flexibility for data sharing in the financial services ecosystem as an evolution. Blockchain can disrupt the banking enterprise esteemed at over $4.8 trillion through disintermediation of key services delivered by banks, varying from authorization and payment systems to expenditures.

In today's market, Non-Fungible Tokens (NFTs) are unique cryptographic tokens that exist on a blockchain and cannot be replicated.

Spin Launch just catapulted a NASA payload into the sky for the first time

U.S. startup SpinLaunch — the company that aims to disrupt the rapidly-growing satellite launch industry by catapulting payloads into space with minimal rocket fuel has just passed a massive test.

The company launched a NASA payload into the sky before recovering it and inspecting the contents to see how they fared after being spun around in its Suborbital Accelerator at up to 10,000 g and 5,000 mph (8,000 km/h).

The test, the company's 10th successful launch, was carried out from Spaceport America in New Mexico on September 27. It's part of a testing campaign to determine whether scientific payloads and satellites could survive the stress of its launch procedure.

In a press statement, the firm said the latest flight demonstrated that the satellite components used are "inherently compatible with the company's launch environment."

SpinLaunch catapults NASA payload skyward

Earlier this year, NASA announced it had signed a Space Act Agreement contract to test SpinLaunch's technology by having a payload launched by the company's kinetic launch system. Partners and government officials watched on as SpinLaunch carried out the mission on September 27.

NASA was not the only payload flung into the sky. SpinLaunch also catapulted payloads from Airbus, Cornell University, and satellite developer Outpost. They were all spun around the company's Suborbital Accelerator at 10,000 g before being launched skyward.

"Flight Test 10 represents a key inflection point for SpinLaunch, as we've opened the Suborbital Accelerator system externally for our customers, strategic partners, and research groups," explained Jonathan Yaney, founder & CEO of SpinLaunch. "The data and insights collected from flight tests will be invaluable for both SpinLaunch, as we further the development of the Orbital Launch system, and for our customers who are looking to us to provide them with low-cost, high-cadence, sustainable access to space."

SpinLaunch has revealed little in the way of concrete details about the test flight, though it did say it had a similar trajectory to its previous tests that flew to altitudes of 30,000 ft (9,150 m). Back in May, the company added an optical payload to its launch system to capture its test flights in first-person.

Massively reducing rocket launch infrastructure

SpinLaunch's first-ever flight test took place last November, and the company's kinetic launch system has been in development since 2015. The company's 33-meter-diameter Suborbital Mass Accelerator is a prototype for its eventual full-size 100-meter Orbital Launch system, which it hopes to have ready for operational launches by 2026.

Both systems are circular accelerators, powered by an electric drive that use a mechanical arm to sling payloads around in circles to reach incredibly high speeds of up to 5,000 mph. They then release the payload through a launch tube and spaceward.

The private space firm argues its method will be much cheaper as it eliminates 70 percent of the fuel and infrastructure requirements of a traditional rocket launch. It is also more environmentally friendly, as it only uses a small rocket engine for the final orbital insertion.

Utah Bionic Leg: The most advanced AI-powered prosthetics 'ever created'

University of Utah researchers have developed the most advanced AI-powered prosthetics "ever created," prompting Ottobock, the world's largest prosthetic manufacturer, to collaborate with them to launch the project globally. "Our LabBionic [Bionic engineering lab] has developed the "Utah Bionic Leg," the most advanced bionic leg ever created. Now, we've forged a partnership with the worldwide leader in the prosthetics industry, @OttobockUK, to bring it to individuals with lower-limb amputations," the university's official account tweeted on October 7.

"The goal of the partnership is to 'refine ability' by combining advanced technologies such as robotics, artificial intelligence, neural engineering with manufacturing, health services and patient care," said Tommaso Lenzi, associate professor at the university's Department of Mechanical Engineering and director of the Bionic Engineering Lab. "We want to make sure the cutting-edge technologies go from the lab to the market as quickly as possible. This partnership will enable us to do exactly that."

The project has been under development for several years representing both students and academics from the university.

How does it work?

The Utah Bionic Leg combines motors, processors, and cutting-edge artificial intelligence (AI), giving amputees the strength and mobility to perform actions that the average person might take for granted.

"It is a superior prosthetic knee, incomparable to any currently available product," said Hans Georg Nader, owner and chairman of the board of directors at Ottobock, on October 5, during the collaborative launch.

Amputees rely on their intact legs and upper body to compensate for the lack of support provided by their prescribed prosthesis. With the Utah Bionic Leg, this is less of a problem because the prosthesis' increased power facilitates mobility. "If you walk faster, it will walk faster for you, and give you more energy. Or, it adapts automatically to the height of the steps in a staircase. Or, it can help you cross over obstacles," said Lenzi.

The technology works like muscle cells

Its claimed superior technological level distinguishes the Utah Bionic Leg from other recommended prostheses. The technology that makes the bionic leg "fundamentally works like the muscle cells in the nervous system of the leg," said Lenzi. to determine the leg's position in space, custom-designed force and torque sensors, as well as accelerometers and gyroscopes, are used. According to the university, these sensors are linked to a computer processor, which translates sensor inputs into movements of the prosthetic joints. "Based on that real-time data," the leg supplies power to the motors in the joints, allowing them to assist in walking, standing up, walking up and down stairs, or maneuvering around obstacles.

The prosthetic leg's 'smart transmission system' connects the electrical motors to the robotic joints. This optimized system adapts the joint behaviours for each activity, "like shifting gears on a bike."

Users can effectively manipulate the prosthetic for extended periods of time, exactly like they would with an intact limb, thanks to the robotic knee, ankle, and toe joints. "It's just so different. It's so much more technical and allows you to do so much more, and it takes so much less energy. That's like the real big benefit for me," said Alec McMorris, a football coach at a School and an amputee who has collaborated closely with the project for the past five years.

New sensor technology and virtual reality are helping in unsupervised physical therapy

Many chronic disabilities could benefit from physical therapy. Around 75% of the years lived with chronic disability go untreated because there just aren't enough physical therapists to go around. The number of patients is pacing alongside population growth and aging, and the reporting of cases of severe ailments is increasingly contributing to the issues facing the field.

Why PTs are holistic

There has been growth in the number of sensor-based techniques, such as on-body sensors that track motion are providing autonomy and precision for some sufferers. The minimalist approach to watches and rings largely relies on motion data and therefore lacks the holistic picture of what a physical therapist (PT) piece together. This includes muscle movement, but also engagement, and tension.

Introducing MuscleRehab

The gap in the muscle-motion treatment plans, or language a PT is trained to understand, has prompted the creation of a physical rehabilitation system, that is unsupervised. Called MuscleRehab, the researchers at MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) along with Massachusetts general hospital (MGH) is designed to help patients seek relief without a PT present. There are three instances of capture, motion tracking, to capture motion activity, and imaging technique called Electrical Impedance Tomography (EIT) that measures what muscles are doing, and a virtual reality (VR) headset and tracking suit. The VR and suit let the patient watch themselves perform alongside a physical therapist.

Accuracy of exercise increased

With those two conditions, the team was able to compare the accuracy of the exercise and had a professional therapist examine the results. The PT could then explain what muscle groups were supposed to be engaged during each exercise. With the visualization of both muscle engagement and motion data during an unsupervised exercise routine, instead of just motion alone, the overall accuracy of the exercises improved by 15%.

The tech is popular AI and IoT

These systems are made up of differing types of sensors working in concert in an Internet of Things (IoT) setting. The artificial intelligence algorithms are running inference modeling to determine how each muscle is moving, and from the data determine which muscle groups, such as surface, or deep, are taking on the most beneficial exercise. This type of imaging of the exercise is similar to being able to use an image, or picture of the exercise and superimpose it on a muscle group. Record the motion and engagement, then have a professional PT look over the results, and recommend exercises. "We wanted our sensing scenario to not be limited to a clinical setting, to better enable data-driven unsupervised rehabilitation for athletes in injury recovery, patients currently in physical therapy, or those with physical limiting ailments, to ultimately see if we can assist with not only recovery but perhaps prevention, says Junyi Zhu, MIT CSAIL Ph.D. student and lead author on a paper about MuscleRehab. "By actively measuring deep muscle engagement, we can observe if the data is abnormal compared to a patient's baseline, to provide insight into the potential muscle trajectory."

NASA successfully tests robot balloon meant to one day explore Venus

The National Aeronautics and Space Administration (NASA) has expanded on its preparation with the goal of one day exploring the surface of Venus. Part of the plan and research included NASA's Propulsion Laboratory (JPL) launch. This was successfully completed over Nevada's Black Rock desert, allowing the agency to prove its ability to control altitude, especially if headed to the planet.

The aerobot

The aerial robotic balloon prototype, also known as the aerobot, could one day "take to the Venusian skies," NASA said on its website, after the balloon completed two test flights in Nevada without any issues.

The high pressure, extreme heat and gases on Venus' surface makes it difficult to prepare any object to be sent there. The lack of hospitability on the planet can hinder even well-prepared spacecraft in a few hours. However, robotic exploration seems to be an option that could work in exploring the planet. A few miles above Venus, there is an area that would allow for an aerobot to move and operate safely.

The concept and prototype balloon

The idea NASA came up with includes "a balloon with a Venus orbiter, with the two working together to study Earth's sister planet. While the orbiter would remain far above the atmosphere, taking science measurements and serving as a communication relay, an aerial robotic balloon, or aerobot, about 40 feet (12 meters) in diameter would travel into it." To test the concept, a research team from NASA's Jet Propulsion Laboratory in Southern California and the Near Space Corporation — a high altitude/near space platforms and flight service provider — in Tillamook, Oregon, carried out the two successful flights of the prototype balloon that is one-third the size of one needed to explore Venus. The scientists and engineers wanted to test the balloon's materials for the first time, allowing the team to assess the possibility of creating a full size aerobot that could explore Venus. The silver balloon was able to fly 4,000 feet (1 kilometer) over Nevada's Black Rock Desert to a location of Earth's atmosphere that resembles the temperature and density the aerobot would experience about 180,000 feet (55 kilometers) above Venus, the engineers of JPL stated.

Successful test

This achievement by NASA shows that the aerobot could access a part of Venus that an orbiter would not be able to because it would be too low to reach. The aerobot could float above Venus for weeks or even months, which would give the researchers enough time to monitor the region's atmosphere. "We're extremely happy with the performance of the prototype. It was launched, demonstrated controlled-altitude maneuvers, and was recovered in good condition after both flights," said robotics technologist Jacob Izraelevitz, who also leads the balloon development as the JPL principal investigator of the flight tests. "We've recorded a mountain of data from these flights and are looking forward to using it to improve our simulation models before exploring our sister planet," he continued.

Past use of balloons for Venus' exploration

Balloons were previously used to explore Venus in 1985 by the twin Soviet Vega 1 and 2 missions, according to NASA. The two balloons, both being about 11.5 feet (3.6 meters) in diameter, lasted about 46 hours on the mission before the batteries depleted. However, the short time the balloons lasted allowed researchers to envision what a longer-duration balloon could do in the Venusian atmosphere.

Researchers create material that transforms from soft to hard when exposed to light

For the first time, researchers use only light and a catalyst to change properties such as hardness and elasticity in molecules of the same type, according to a new study published October 13 in *Science*.

Inspired by living things like trees and shellfish, the team created a unique material that is ten times as durable as natural rubber and may lead to more flexible electronics and robots.

The ability to control the physical properties of a material using light as a trigger is potentially transformative

"This is the first material of its type," stated Prof. Zachariah Page, co-author of the study, in a press release. "The ability to control crystallization, and therefore the physical properties of the material, with the application of light is potentially transformative for wearable electronics or actuators in soft robotics."

For a long time, scientists have worked to create synthetic materials that imitate the characteristics of living structures like skin and muscle. Structures in living things effortlessly mix qualities like strength and flexibility. However, when employing a combination of diverse synthetic materials to simulate these properties in the lab, the materials often fail, i.e., disintegrate where the different materials meet. "Oftentimes, when bringing materials together, particularly if they have very different mechanical properties, they want to come apart," said Page. However, by using light to vary how rigid or elastic the material would be, Page and his colleagues could regulate and modify the structure of a material that resembled plastic.

Remarkably, a harder material developed where the light touched it

In this different strategy, the chemists began with a monomer. Simply put, this single molecule forms larger structures known as polymers by joining with other molecules identical to it, much like the polymer in the most widely used plastic. After testing a dozen catalysts, they discovered one that produced a 'semicrystalline' polymer that resembled those in synthetic rubber when combined with their monomer and exposed to visible light. Remarkably, a harder material developed where the light had touched it, while the unlit portions kept their malleable, soft characteristics. The substance was stronger and could be stretched farther than other mixed materials since it was formed of a single material with distinct properties.

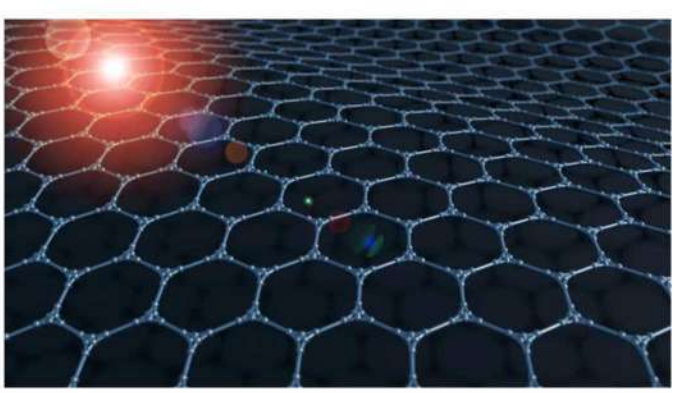
The novel procedure is quick, affordable, energy-efficient, and environmentally friendly

The monomer and catalyst are readily available commercially, with the reaction occurring at ambient temperature. Additionally, the experiment's light source was blue LED which is inexpensive.

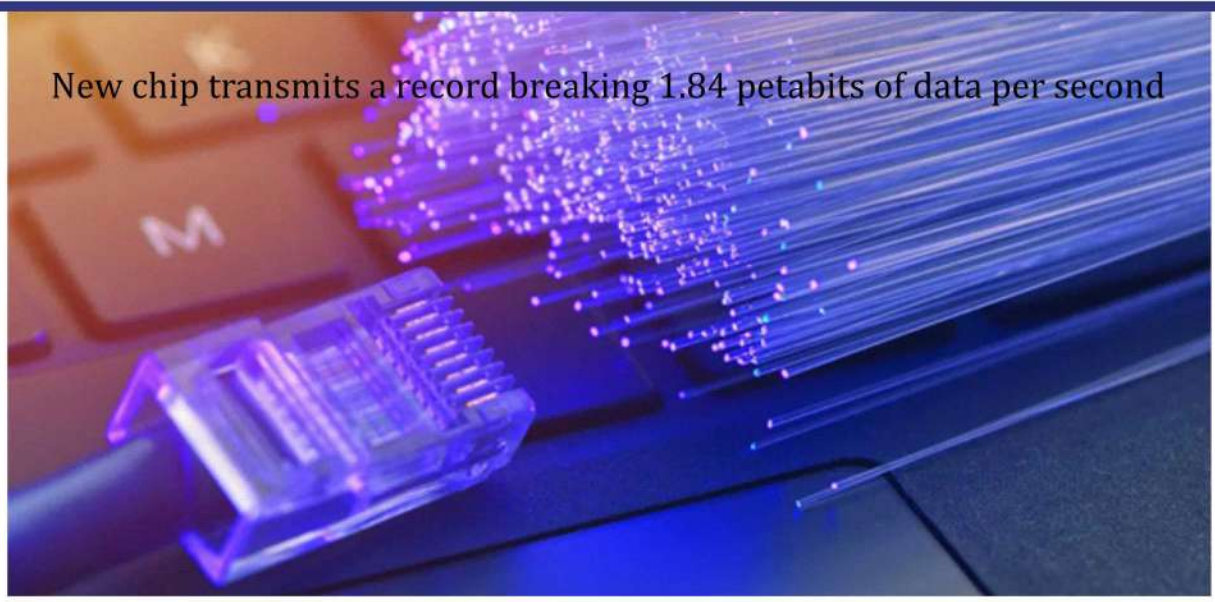
The researchers claim the reaction uses minimal hazardous waste and takes less than an hour, making the procedure quick, affordable, energy-efficient, and environmentally friendly.

In robotics, it is preferable to use strong and elastic materials to enhance movement and durability

According to the research team, the material may be utilized as a flexible foundation to secure electronic components in medical devices or wearables. In robotics, both strong and elastic materials are preferable for improving movement and durability, so there is potential to utilize the novel material in this industry, too.



To further validate the material's utility, the researchers will next try to create more objects using the substance. Lead author of the study and doctoral student at UT Austin, Adrian Rylski, stated, "We are looking forward to exploring methods of applying this chemistry towards making 3D objects containing both hard and soft components."



New chip transmits a record breaking 1.84 petabits of data per second

We all want more internet power and now we may just get it. A single computer chip has transmitted a record 1.84 petabits of data per second via a fiber-optic cable, reported an article by the *News Scientist* on October 20.

230 million photographs downloaded in one second

That amount exhibited enough bandwidth to download 230 million photographs in that time. The initiative was led by Asbjorn Arvad Jorgensen at the Technical University of Denmark in Copenhagen.

It saw the use of a photonic chip, a microchip containing two or more photonic components which form a functioning circuit. This technology detects, generates, transports, and processes light to divide a stream of data into thousands of separate channels and transmit them all at once over 7.9 kilometres.

"First, the team split the data stream into 37 sections, each of which was sent down a separate core of the fibre-optic cable. Next, each of these channels was split into 223 data chunks that existed in individual slices of the electromagnetic spectrum. This 'frequency comb' of equidistant spikes of light across the spectrum allowed data to be transmitted in different colours at the same time without interfering with each other, massively increasing the capacity of each core," explained New Scientist.

In the past, we have witnessed data transfer rates of up to 10.66 petabits per second but they were created through the use of bulky inefficient and impractical equipment. This new and improved research sets a record for transmission using a single computer chip as a light source. The technology could see energy costs significantly slashed and bandwidths severely increased.

Using dummy data

The experiment used so much data that no computer today exists that could supply or receive this much information at this rate. The team had to therefore pass "dummy data" through all channels, says Jorgensen, and experiment on the output one channel at a time to ensure that it was all being sent and recovered adequately.

"You could say the average internet traffic in the world is about a petabit per second. What we transmit is two times that," says Jorgensen. "It's an incredibly large amount of data that we're sending through, essentially, less than a square millimetre [of cable]. It just goes to show that we can go so much further than we are today with internet connections."

The chip is not yet complete. It still needs a single laser and devices to encode data into each of the output streams. But Jorgensen claims both these elements could be integrated onto the chip itself. This would make the new entire apparatus about the size of a mere matchbox, making it very practical for daily use.

Jorgensen further adds that his team's new device could transmit as much data as 8251 matchbox-sized devices currently can. The invention could forever change how we consume data and how we execute all kinds of tasks in computing.

Shutterstock collaborates with OpenAI to start selling AI-generated art

Shutterstock recently announced that it will partner with OpenAI to start selling content created using artificial intelligence software.

Text-to-image AI technology

The stock image company is incorporating OpenAI's text-to-image prototype DALL-E into its content, allowing users to create images based on words they type into the software. Shutterstock will allow users to receive direct access DALL-E through its website.

Shutterstock and Open-AI past and present collaboration

Shutterstock began its partnership with OpenAI starting in 2021. During that time, Shutterstock sold images to OpenAI to help create DALL-E. "The data we licensed from Shutterstock was critical to the training of DALL-E," said Sam Altman, CEO at OpenAI. Since partnering, the two companies are working as a team to both combine the technology and input text needed to create art, while generating OpenAI's output of new and creative art using artificial intelligence to use for the stock image company. "We're excited for Shutterstock to offer DALL-E images to its customers as one of the first deployments through our API, and we look forward to future collaborations as artificial intelligence becomes an integral part of artists' creative workflows," Altman said.

AI-generated content creation

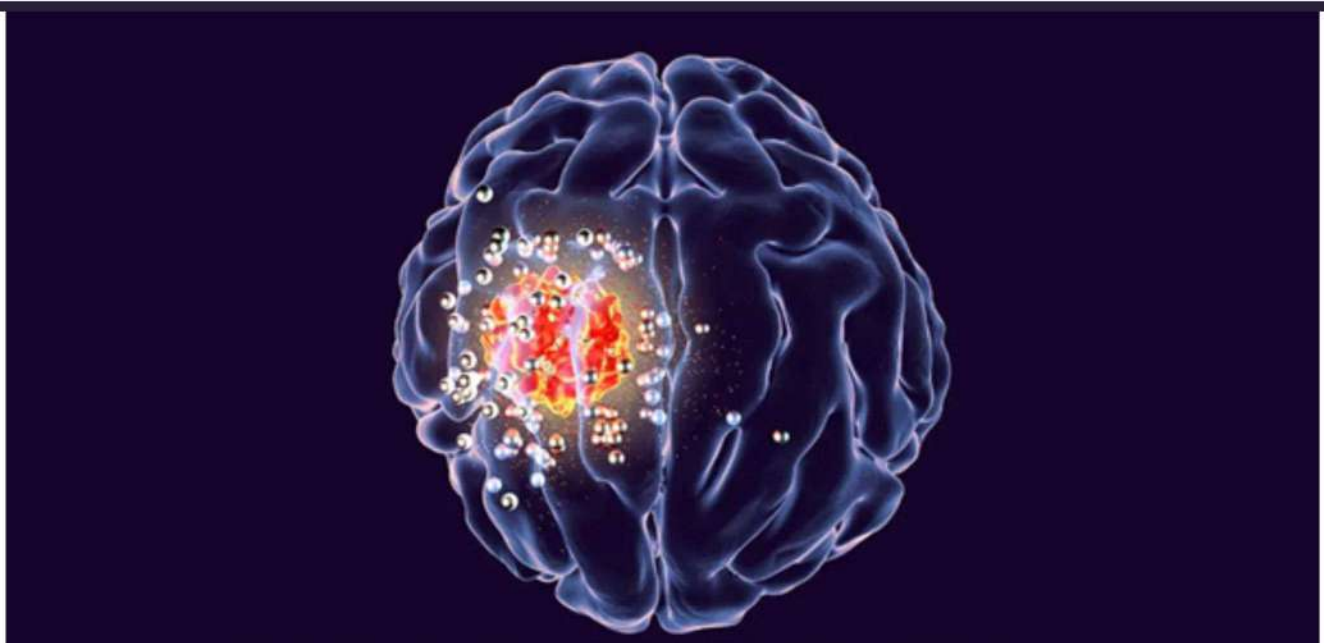
The images created by artificial intelligence are formed when the machine learning technology has been given information by creators through written words. The software then "learns" from the datasets. Each result from the AI-generated art differs greatly.

Art is evolving through AI

The art created by artificial intelligence is developing and advancing in numerous ways, thanks to machine learning and novel technology. "The mediums to express creativity are constantly evolving and expanding. We recognize that it is our great responsibility to embrace this evolution and to ensure that the generative technology that drives innovation is grounded in ethical practices," said Paul Hennessy, chief executive officer at Shutterstock. "And we're committed to developing best practices and experiences to deliver on our purpose, which is to empower the world to create with confidence." Although the art is AI-generated, the company also believes in protecting copyright and intellectual property (IP) rights of its creators. "Shutterstock continues to lead in developing policy and procedures and employs methods to ensure that usage rights and proper licenses are secured for all featured content including AI-generated content," the company said.

Compensation for AI artists

Along with the innovative collaboration, Shutterstock also launched a fund that will be used to compensate artists for their work. The company said contributors would receive a portion of royalties when their AI-generated art is used. It mentioned that it aims to remain transparent towards its creators regarding art contribution and wants to create a new industry standard for the artists. It hopes to create new "revenue streams" and income opportunities for its users.



A small wireless implant could help kill deadly brain tumors

Researchers at Stanford Medicine developed and tested a wireless device in mice that is small enough to be inserted into a mouse's brain to kill cancerous cells. This, in the long run, could put an end to unpleasant and prolonged cancer treatments that patients with brain tumors have to undergo. The implant in question is activated remotely and heats up nanoparticles injected into the tumor to start off the killing spree of cancer cells.

The researchers treated mice with brain tumors for 15 minutes of daily treatment for over 15 days and recorded significantly increased survival times. "The nanoparticles help us target the treatment to only the tumor, so the side effects will be relatively less compared with chemotherapy and radiation," said Hamed Arami, Ph.D., co-lead author of the paper.

Photothermal treatments, which use light to heat up nanoparticles while fighting brain tumors, are nothing new; however, they can only be applied during surgeries while the tumor is exposed to the light source.

The late Sam Gambhir, MD, former chair of radiology at Stanford Medicine and a pioneer in molecular imaging contacted Ada Poon, Ph.D., a Stanford University associate professor of electrical engineering to come up with a new fashion that'll help fight brain tumors without baring the brain.

"When I got that email from Sam, I saw that what he wanted to do was really aligned with what our lab is focusing on, which is using electronics to treat diseases," Poon said.

How does it work?

After a four-year hard work, researchers developed a system that can generate heat precisely at the site of tumors to defeat them. The wireless implant is implanted between the skin and the skull; then the gold nanoparticles are injected into the tumor through a tiny hole in the skull. The implant emits infrared light, which penetrates brain tissue to activate the nanoparticles that increase in temperature by up to 5 degrees Celsius. Various sizes of tumors can be killed by adjusting the power and wavelength of light.

"We think this short amount of heating, which is in the clinically acceptable range, is not affecting normal activities," Arami said.

According to the researchers, mice that received the treatment lived longer than untreated mice. The survival times doubled, even tripled on average. Combined with chemotherapy, the treatment was a success in making the mice even longer.

"Glioblastoma patients don't often live more than two to three years after diagnosis because you can't get rid of every part of the tumor, and the tumor can become drug-resistant or radiation-resistant," Arami said. "The goal is to combine this with other treatments to extend survival."

New drug could help livers self-regenerate and end organ transplant waits

The liver is known for its ability to regenerate. It can completely regrow itself even after two-thirds of its mass has been surgically removed. But damage from medications, alcohol abuse or obesity can eventually cause the liver to fail. Currently, the only effective treatment for end-stage liver disease is transplantation.

However, there is a dearth of organs available for transplantation. Patients may have to wait from 30 days to over five years to receive a liver for transplant in the U.S. Of the over 11,600 patients on the waiting list to receive a liver transplant in 2021, only a little over 9,200 received one.

But what if, instead of liver transplantation, there were a drug that could help the liver regenerate itself?

I am the founding director of the Pittsburgh Liver Research Center and run a lab studying liver regeneration and cancer. In our recently published research, my team and I found that activating a particular protein with a new medication can help accelerate regeneration and repair after severe liver injury or partial surgical removal in mice.

Key players in liver regeneration

The liver performs over 500 key functions in your body, including producing proteins that carry fat through the body, converting excess glucose into glycogen for storage and breaking down toxins like ammonia, among others.

Liver cells, or hepatocytes, take on these many tasks by a divide-and-conquer strategy, also called zonation. This separates the liver into three zones with different tasks, and cells are directed to perform specialized functions by turning on specific genes active in each zone. However, exactly what controls the expression of these genes has been poorly understood.

Over the past two decades, my team and other labs have identified one group of 19 proteins called Wnts that play an important role in controlling liver function and regeneration. While researchers know that Wnt proteins help activate the repair process in damaged liver cells, which ones actually control zonation and regeneration, as well as their exact location in the liver, have been a mystery.

To identify these proteins and where they came from, my team and I used a new technology called molecular cartography to identify how strongly and where 100 liver function genes are active. We found that only two of 19 Wnt genes, Wnt2 and Wnt9b, were functionally present in the liver. We also found that Wnt2 and Wnt9b were located in the endothelial cells lining the blood vessels in zone 3 of the liver, an area that plays a role in a

To our surprise, eliminating these two Wnt genes resulted in all liver cells expressing only genes typically limited to zone 1, significantly limiting the liver's overall function. This finding suggests that liver cells experience an ongoing push and pull in gene activation that can modify their functions, and Wnt is the master regulator of this process.

Eliminating the two Wnt genes from endothelial cells also completely stopped liver cell division, and thus regeneration, after partial surgical removal of the liver.

Liver regeneration after Tylenol overdose

We then decided to test whether a new drug could help recover liver zonation and regeneration. This drug, an antibody called FL6.13, shares similar functions with Wnt proteins, including activating liver regeneration.

Over the course of two days, we gave this drug to mice that were genetically engineered to lack Wnt2 and Wnt9b in their liver endothelial cells. We found that the drug was able to nearly completely recover liver cell division and repair functions.

Lastly, we wanted to test how well this drug worked to repair the liver after Tylenol overdose. Tylenol, or acetaminophen, is an over-the-counter medication commonly used to treat fever and pain. However, an overdose of Tylenol can cause severe liver damage. Without immediate medical attention, it can lead to liver failure and death. Tylenol poisoning is one of the most common causes of severe liver injury requiring liver transplantation in the U.S. Despite this, there is currently only one medication available to treat it, and it is only able to prevent liver damage if taken shortly after overdose.

We tested our new drug on mice with liver damage from toxic doses of Tylenol. We found that one dose was able to decrease liver injury biomarkers – proteins the liver releases when injured – in the blood and reduce liver tissue death. These findings indicate that liver cell repair and tissue regeneration are occurring.

Reducing the need for transplantation

One way to address liver transplantation shortages is to improve treatments for liver diseases. While current medications can effectively cure hepatitis C, a viral infection that causes liver inflammation, other liver diseases have not seen the same progress. Because very few effective treatments are available for illnesses like nonalcoholic fatty liver disease and alcoholic liver disease, many patients worsen and end up needing a liver transplant.